ORC6 gene

origin recognition complex subunit 6

Normal Function

The *ORC6* gene provides instructions for making a protein that is important in the copying of a cell's DNA before the cell divides (a process known as DNA replication). The protein produced from this gene is one of a group of proteins known as the origin recognition complex (ORC). (The complex is made up of the proteins ORC1 to ORC6, which are produced from different genes.) ORC attaches (binds) to certain regions of DNA known as origins of replication (or origins), where the process of DNA copying begins. This complex attracts additional proteins to bind to it, forming a larger group of proteins called the pre-replication complex. When the pre-replication complex is attached to the origin, replication is able to begin at that location. This tightly controlled process, called replication licensing, helps ensure that DNA replication occurs only once per cell division and is required for cells to divide.

ORC also attaches to a form of DNA called heterochromatin. Heterochromatin is densely packed DNA that contains few functional genes, but it is important for controlling gene activity and maintaining the structure of chromosomes. It is unclear what effect ORC binding has on heterochromatin.

In addition to its roles as part of ORC, the ORC6 protein is involved in the process by which the dividing cells separate from one another (cytokinesis).

Health Conditions Related to Genetic Changes

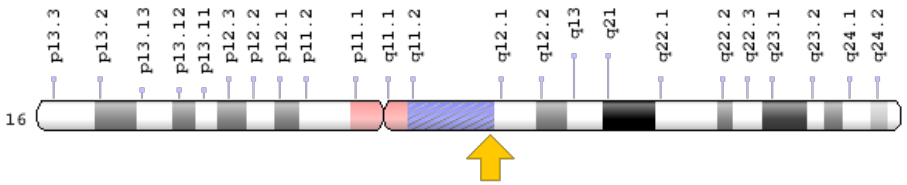
Meier-Gorlin syndrome

At least two mutations in the *ORC6* gene have been found to cause Meier-Gorlin syndrome, a condition characterized by short stature, underdeveloped kneecaps, and small ears. One mutation changes a single protein building block (amino acid) in the ORC6 protein, replacing the amino acid tyrosine at protein position 232 with the amino acid serine (written as Tyr232Ser). The other gene mutation leads to production of an abnormally short protein. These changes impair assembly of the pre-replication complex, disrupting replication licensing; however, it is not clear how a reduction in replication licensing leads to Meier-Gorlin syndrome. Researchers speculate that such a reduction delays the cell division process, which slows growth of the bones and other tissues during development. Some studies suggest that alterations of ORC6 impair cytokinesis, which may also delay cell division. It is not known why development of the kneecaps and ears is particularly delayed.

Chromosomal Location

Cytogenetic Location: 16q11.2, which is the long (q) arm of chromosome 16 at position 11.2

Molecular Location: base pairs 46,689,646 to 46,698,394 on chromosome 16 (Homo sapiens Annotation Release 108, GRCh38.p7) (NCBI)



Credit: Genome Decoration Page/NCBI

Other Names for This Gene

- ORC6_HUMAN
- ORC6L
- origin recognition complex, subunit 6

Additional Information & Resources

Educational Resources

- Molecular Biology of the Cell (fourth edition, 2002): DNA Synthesis Begins at Replication Origins
  https://www.ncbi.nlm.nih.gov/books/NBK26826/#_A796_
- The Cell: A Molecular Approach (second edition, 2000): Origins and the Initiation of Replication
  https://www.ncbi.nlm.nih.gov/books/NBK9940/#_A789_

Scientific Articles on PubMed

- PubMed
  https://www.ncbi.nlm.nih.gov/pubmed?term=%28ORC6%5BTIAB%5D%29+OR+%28ORC6L%5BTIAB%5D%29+AND+%28%28Genes%5BMH%5D%29+OR+%28Genetic+Phenomena%5BMH%5D%29%29+AND+english%5Bla%5D+AND+human%5Bmh%5D+AND+%22last+3600+days%22%5Bdp%5D

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  http://omim.org/entry/607213

Research Resources

- Atlas of Genetics and Cytogenetics in Oncology and Haematology
  http://atlasgeneticsoncology.org/Genes/GC_ORC6.html
- ClinVar
  https://www.ncbi.nlm.nih.gov/clinvar?term=ORC6%5Bgene%5D
- HGNC Gene Family: Origin recognition complex
  http://www.genenames.org/cgi-bin/genefamilies/set/960
- HGNC Gene Symbol Report
  http://www.genenames.org/cgi-bin/gene_symbol_report?q=data/hgnc_data.php&hgnc_id=17151
- NCBI Gene
  https://www.ncbi.nlm.nih.gov/gene/23594
- UniProt
  http://www.uniprot.org/uniprot/Q9Y5N6

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Reviewed: February 2014
Published: March 21, 2017

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